**CHAPTER TWO**

**LITERATURE REVIEWS**

This chapter deals with the review of literature considered important to this study. The literature review is discussed under the following sub-headings:

**2.1 Conceptual Framework**

The conceptual framework serves as a structured approach to for understanding the impact of technology in education, particularly within senior secondary schools in Edo South Senatorial District. This framework integrates several key components:

**Technological Resources and Infrastructure:** At the core of technology integration is the availability and quality of technological resources and infrastructure. Technological resources include hardware (computers, tablets), software (educational applications, learning management systems), connectivity (internet access) and interactive whiteboards. The disparity in resource availability often correlates with socio-economic factors, affecting students' exposure to digital learning tools. As Warschauer (2004) notes, "The digital divide reflects broader social inequalities, where access to technology can significantly affect educational outcomes".

The effectiveness of these resources in enhancing learning depends significantly on their accessibility and usability within the educational environment. Tinio (2002) argues that "the mere presence of technology does not guarantee better learning outcomes; it is the effective integration into the learning process that matters." This highlights the need for both access to technology and the capacity to use it effectively.

**Teacher Preparedness and Professional Development:** Teacher readiness is a critical component of the conceptual framework. Without adequate training and support, even the best technological tools may go underutilized. Effective technology integration requires teachers to possess not only technical skills but also pedagogical strategies that leverage technology for enhanced learning. Ingersoll and Merrill (2011) highlight that "professional development is crucial in equipping teachers with the necessary skills and confidence to integrate technology into their teaching practices". The reluctance to adopt new technologies can often be attributed to a lack of training and support.

Hence, professional development programs are essential for equipping teachers with both the technical skills and the pedagogical strategies necessary to integrate technology into their teaching practices. Ertmer et al. (2012) observed that "teachers' beliefs and attitudes toward technology are often shaped by their comfort level with the tools and their perceived ability to integrate these tools into their pedagogy."

**Student Engagement and Learning Outcomes:** Student engagement is another crucial aspect of this framework. Engaged students are more likely to participate actively in the learning process, leading to better academic outcomes. Interactive and engaging learning experiences facilitated by technology can lead to deeper understanding and retention of information. Technology can facilitate this engagement by providing interactive and personalized learning experiences.

According to Mayer (2003), "Multimedia learning environments that use words and pictures together can improve students' ability to transfer knowledge". The use of interactive tools, such as simulations and educational games, has been shown to increase motivation and engagement among students. Schlechty (2011) also noted that "students are more likely to be engaged in learning activities that are meaningful and relevant to their lives." Educational technologies, such as simulations, games, and virtual labs, can make abstract concepts more concrete and relatable, thus enhancing student engagement.

**Linkages in the Framework:** The conceptual framework for this study highlights the interconnected nature of various factors that influence the successful integration of technology in education. One of the key elements is infrastructure, which includes both physical resources like computers and internet access, and soft infrastructure such as technical support and digital literacy programs. Without a strong infrastructure, other efforts to integrate technology may falter. For example, teachers may be well-trained and eager to use digital tools in their classrooms, but if the internet is unreliable or computers are outdated, their efforts will be hampered.

The interplay between these components is critical. For instance, the presence of technological resources alone does not guarantee improved educational outcomes; it must be complemented by teacher preparedness and a conducive learning environment. This framework underscores the multifaceted nature of technology integration in education, where each element must align to maximize benefits.

**Equity and Access:** Equity and access to technological resources are significant concerns, particularly in regions like Edo South Senatorial District, where disparities in socio-economic status can affect the distribution and utilization of educational technologies. In many cases, schools in wealthier areas have better access to technology, while those in less affluent regions may struggle with outdated equipment or lack of internet access. This disparity, known as the digital divide, poses a serious challenge to achieving educational equity. According to Warschauer (2004), "addressing the digital divide requires more than just providing access to technology; it also involves ensuring that all students have the necessary support and opportunities to use technology effectively in their learning." This means that merely providing devices like computers or tablets is not enough; students also need the skills, guidance, and encouragement to use these tools in ways that enhance their learning experiences.

In Edo South, where there may be significant differences in resources between urban and rural schools, the digital divide can contribute to a widening gap in educational outcomes. Students in under-resourced schools may fall behind their peers, not because they lack ability, but because they lack access to the tools that facilitate modern learning. This situation underscores the importance of implementing strategies that not only provide technology but also ensure that all students, regardless of their background, can benefit from its use. This could involve targeted funding, teacher training, and community involvement to bridge the gap between different schools and ensure that technology enhances learning for all students.

**2.2 Theoretical Framework**

The theoretical framework of this study draws on several educational theories that explain how technology can influence teaching and learning processes. One of the primary theories relevant to this study is the ‘Social Learning Theory’ by Albert Bandura. Bandura (1977) posits that learning occurs in a social context and can be facilitated through observation, imitation, and modeling. In the context of technology in education, this theory suggests that students can learn effectively through interactive technologies that allow them to observe and engage with content and peers in meaningful ways. For example, educational software that provides simulations or collaborative projects can enhance learning by allowing students to observe the outcomes of their actions in a controlled, virtual environment.

Another relevant theory is the Technology Acceptance Model (TAM), which helps explain how users come to accept and use technology. According to Davis (1989), two main factors influence this acceptance: perceived usefulness and perceived ease of use. In the educational context, if teachers and students perceive that technology will make learning more effective and find it easy to use, they are more likely to embrace it. This model is particularly useful for understanding how to encourage the adoption of technology in schools, especially in areas where there may be resistance due to unfamiliarity or fear of change.

The Constructivist Theory of Learning, championed by theorists like Jean Piaget and Lev Vygotsky, is also critical in understanding the role of technology in education. Constructivism suggests that learners construct their own understanding and knowledge of the world, through experiences and reflecting on those experiences. Technology, when used appropriately, can provide rich, interactive environments that support this kind of active, student-centered learning. For instance, digital tools that allow students to create content, such as videos or blogs, or to engage in problem-solving tasks, align well with constructivist principles.

Another theory is the Technological Pedagogical Content Knowledge (TPACK). The TPACK theory emphasizes the interconnectedness of technology, pedagogy, and content knowledge. Koehler and Mishra (2009) argue that "effective technology integration for teaching specific subject matter requires understanding and negotiating the relationships between these three components". This theory is particularly relevant in identifying the types of professional development that teachers need, focusing not just on technological skills but also on integrating these skills with pedagogical and content knowledge.

Rogers in his Rogers' Diffusion of Innovations Theory provides insight into how new technologies are adopted within educational settings. Factors such as "relative advantage, compatibility, complexity, trialability, and observability" play a crucial role in the adoption process (Rogers, 2003). This theory helps explain why some schools are more successful than others in integrating technology, highlighting the importance of perceived benefits and ease of use.

Another educational theory to consider is the Constructivist Learning Theory. Constructivist theories, particularly those of Vygotsky (1978), emphasize the active role of learners in constructing knowledge through social interaction and hands-on experiences. Technology can support constructivist learning by providing interactive and collaborative tools that facilitate exploration and discovery. As Jonassen (1994) states, "Technologies provide new ways for learners to engage in constructing their own knowledge through active, experiential, and contextual learning experiences".

These theories provide a foundation for understanding how and why technology can be a powerful tool in education. They highlight the importance of creating learning environments that are not only rich in content but also interactive and engaging, allowing students to take an active role in their learning.

**2.3 Empirical Studies**

Empirical studies provide practical evidence of the effects of technology on educational practices and offering insights into the practical implications of theoretical frameworks.

**Study 1: Impact of Technology on Student Engagement and Academic Performance**

* **Purpose:** The study of Adewale & Alabi, (2019) explored the correlation between technology use and student engagement, and its subsequent impact on academic performance in senior secondary schools.
* **Sample and Sampling Technique:** The study surveyed 500 students from 20 schools across urban and rural areas using a stratified random sampling method.
* **Instruments for Data Collection:** Questionnaires measuring engagement levels and academic performance data were collected.
* **Method of Data Analysis:** Quantitative data analysis was conducted using regression models to identify significant predictors of academic performance.
* **Major Findings:** The study found a positive correlation between the frequency of technology use and student engagement, which in turn was linked to higher academic achievement. It concluded that "students who regularly used educational software and internet resources performed better academically than those who do not".

**Study 2: Barriers to Technology Integration in Edo South Schools**

* **Purpose:** The study by Obi and Okoro (2020) aimed to investigate the barriers hindering the effective integration of technology in secondary schools in Edo South Senatorial District, Edo State, Nigeria.
* **Sample and Sampling Technique:** The researchers used purposive sampling to select 20 secondary schools across both urban and rural areas of Edo South, involving 200 teachers and 500 students. The schools were selected to represent varying levels of access to technological resources.
* **Instruments for Data Collection:** Data were collected through teacher and student questionnaires that focused on access to technology, challenges faced in using technology, and the level of support provided for technology integration. Additionally, semi-structured interviews were conducted with school administrators to gain deeper insights.
* **Method of Data Analysis:** The researchers employed descriptive statistics to summarize the data and thematic analysis for the interview transcripts.
* **Major Findings:** The study identified several barriers to technology integration, including a lack of infrastructure, inadequate teacher training, and insufficient technical support. The study found that "rural schools are particularly disadvantaged, with limited access to electricity and internet, further widening the digital divide between rural and urban schools in Edo South" (Obi & Okoro, 2020). Teachers also reported feeling underprepared to integrate technology into their lessons due to a lack of professional development opportunities.

**Study 3: Professional Development and Technology Use in the Classroom**

* **Purpose:** Emenike and Osarenren (2018) aimed to examine the impact of professional development on teachers' ability to integrate technology into their teaching practices in Nigerian secondary schools.
* **Sample and Sampling Technique:** The study selected 150 secondary school teachers from 15 schools in Edo State using stratified random sampling to ensure representation from both public and private institutions.
* **Instruments for Data Collection:** Data were gathered using teacher self-assessment surveys that focused on their comfort level and frequency of technology use in the classroom. Professional development records were also reviewed to assess the extent of training teachers had received.
* **Method of Data Analysis:** Correlation analysis was used to determine the relationship between the amount of professional development teachers received and their use of technology in the classroom.
* **Major Findings:** The study found a strong positive correlation between professional development and technology use. Teachers who participated in ongoing professional development reported higher levels of confidence and frequency in using educational technologies. The researchers concluded that "continuous, hands-on professional development is crucial in helping teachers adopt and integrate technology effectively" (Emenike & Osarenren, 2018).

**Study 4: The Role of Infrastructure in Technology Use in Education**

* **Purpose:** A study by Ojo and Abimbola (2017) sought to assess the role of infrastructure in determining the extent of technology use in Nigerian secondary schools, particularly in the southern regions of the country.
* **Sample and Sampling Technique:** The study surveyed 400 students and 150 teachers from 12 secondary schools in southern Nigeria, selected using random cluster sampling, with schools grouped based on their infrastructural quality (high, medium, and low).
* **Instruments for Data Collection:** Questionnaires were used to collect data from teachers and students on the availability of technological resources such as computers, projectors, and internet access. Additionally, on-site observations were conducted to verify the availability and functionality of infrastructure.
* **Method of Data Analysis:** Multivariate analysis was used to assess the relationship between infrastructure quality and the level of technology use.
* **Major Findings:** The study revealed that schools with better infrastructure saw higher levels of technology use by both teachers and students. "Schools with functional computer labs, reliable internet, and consistent electricity were significantly more likely to integrate technology into teaching and learning" (Ojo & Abimbola, 2017). The study concluded that improving infrastructure is a critical first step in enhancing technology use in Nigerian schools.

**Study 5: Impact of Technology on Student Engagement in Science Subjects**

* **Purpose:** The purpose of this study by Adesanya and Idowu (2016) was to explore the effect of technology-enhanced learning environments on student engagement and performance in science subjects in Nigerian secondary schools.
* **Sample and Sampling Technique:** A sample of 350 students from 8 secondary schools in Lagos State was selected through stratified random sampling, ensuring a mix of students from different socio-economic backgrounds.
* **Instruments for Data Collection:** Student engagement was measured using a combination of surveys and classroom observations. Standardized test scores in science subjects were also used to evaluate academic performance.
* **Method of Data Analysis:** The researchers employed both descriptive statistics and inferential analysis, using t-tests to compare engagement and performance levels between students who had access to technology-enhanced lessons and those who did not.
* **Major Findings:** The study found that "students who participated in technology-enhanced learning environments were more engaged and performed significantly better in science subjects compared to those who did not" (Adesanya & Idowu, 2016). The use of interactive simulations and educational software was particularly effective in improving understanding of complex scientific concepts.

**2.4 Appraisal of Reviewed Literature**

The literature reviewed highlights the transformative potential of technology in education while also acknowledging the significant barriers to its effective integration. The studies consistently show that technology can enhance student engagement and academic performance, provided that adequate resources and teacher training are available. However, gaps remain in understanding the unique challenges faced by schools in different socio-economic and geographical contexts, such as those in Edo South Senatorial District.

**Gap in Literature:** There is a notable gap in localized research that examines the specific conditions and challenges of integrating technology in Nigerian schools, particularly in regions like Edo South Senatorial District. Most existing studies focus on broader national or international contexts, often overlooking the unique cultural, economic, and infrastructural factors that influence technology adoption in specific areas. This study aims to fill this gap by providing a detailed analysis of the factors influencing technology integration in this specific context, offering insights that can inform policy and practice at both local and national levels.